

“Market Security”: Historical and forward- looking perspectives

Mark Hayes

Research Fellow

Program on Energy and Sustainable Development

Stanford University

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Outline

1. Historical perspective

- Security in the “old world” of gas trade
- Insights from Geopolitics of Gas Study
(<http://pesd.stanford.edu/gas>)

2. Market Security in the “New World”

- Some fundamentals of California and global gas markets
- A regulatory role for managing LNG supply security?

International Gas Trade Projects: Lessons from History

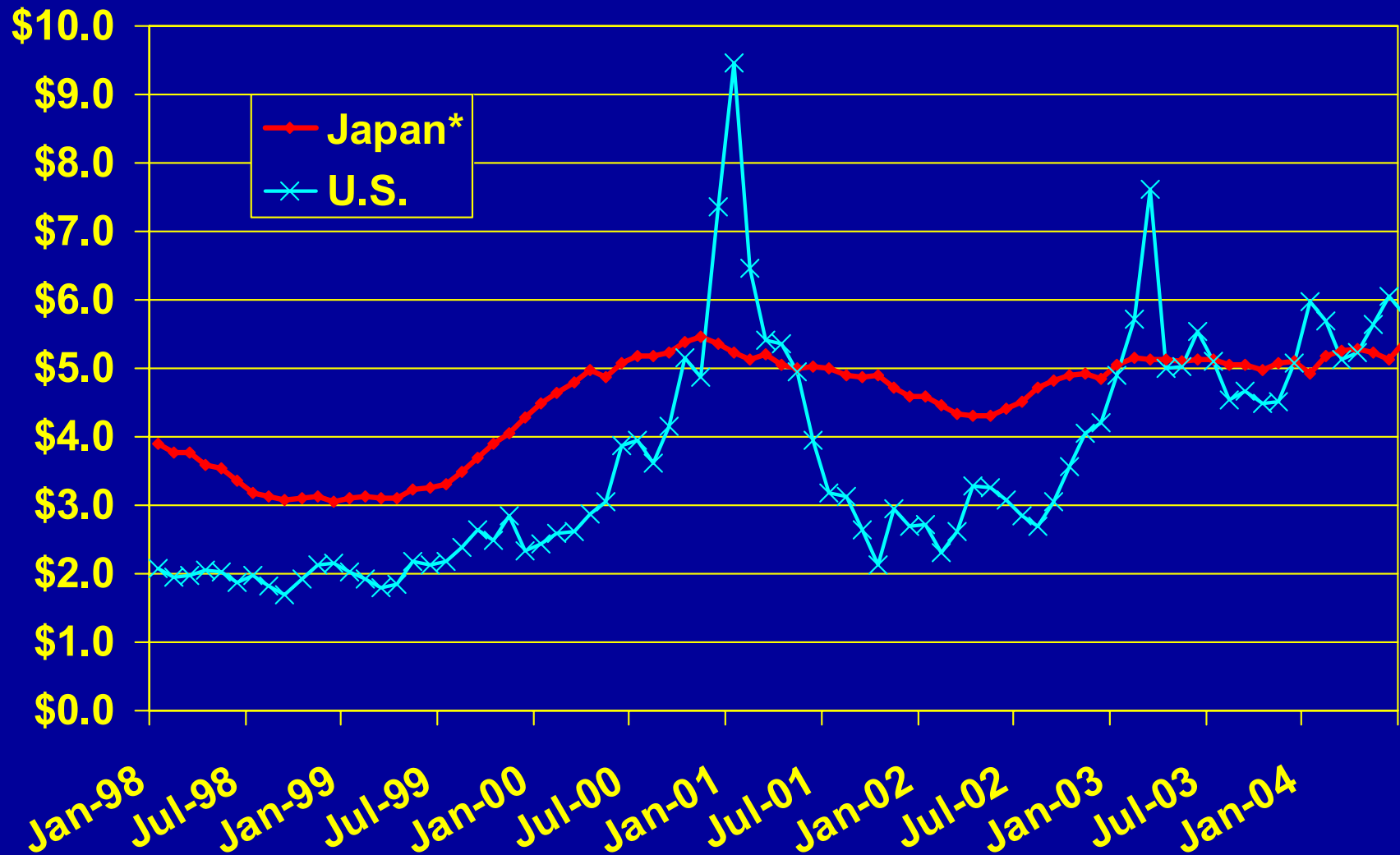


Market Security in the “Old World” Gas Trade

- Until recently, LNG trade best imagined as floating pipelines
 - Few importers
 - Rigid long-term, take-or-pay contracts (with destination clauses)
 - Muted price incentives to divert cargoes
- Regulated monopolies (and state-owned companies) in Europe and Japan purchase gas and LNG to ensure very stable supplies
 - full project costs passed on to end-use consumers—whether they need the gas or not.

Historical U.S. and Japanese Gas Prices

(\$/mmbtu)



*US wellhead price, average of Japanese import prices, including regas costs

Historical Interruptions by Gas Suppliers

Year	Event	Result
1981-1983	Algeria (1981 to 1983) "Gas Battle" with Italy, France, Spain, Netherlands, and the United States.	Pipeline shipments to Italy withheld. France, Netherlands negotiate. US and Spain trade largely stopped.
April 1986	Strike among Norwegian offshore workers spread to British part of the Frigg field.	UK lost 25% of gas supplies for several days.
Nov 1997	Terrorist bomb explodes in onshore section of the Transmed pipeline to Italy.	Supplies maintained through storage and additional deliveries from alternative suppliers (pipeline and LNG).
2001	Civil unrest in Aceh, Indonesia disrupts Arun LNG shipments.	Arun shut down for several months; Exports to Japanese and Korean buyers curtailed.
1999-2004	Sonatrach (Algeria) refuses to ship cargo to Duke (US) in contract dispute	Arbitration continues. Total Algerian shipments to the U.S. slowed, but non-Duke trade continues.
Sept 2003	Fire at Algeria's Arzew complex	Multi-week outage at one train.
Jan 2004	Explosion (due to technical failure) at Skikda complex severely damages 3 of 6 liquefaction trains.	Exports to Spain and France maintained with spare capacities in LNG and pipelines. French demand slump minimizes impacts (high storage)
March 2004	Domestic political pressures cause Argentine government to curtail exports to Chile	Between April and June 2004, 20-50% reductions from contracted volumes.
Jan 2005	Turkmenistan withholds all gas exports in bid to renegotiate sales prices to Ukraine and Russia (Gazprom)	Ukraine renegotiates in days; Russia and Gazprom renegotiate in February 2005
Jan 2005	Indonesia's Pertamina breaks contract commitments and curtails LNG shipments from Bontang and Arun	Japanese buyers upset; Impacts not yet apparent

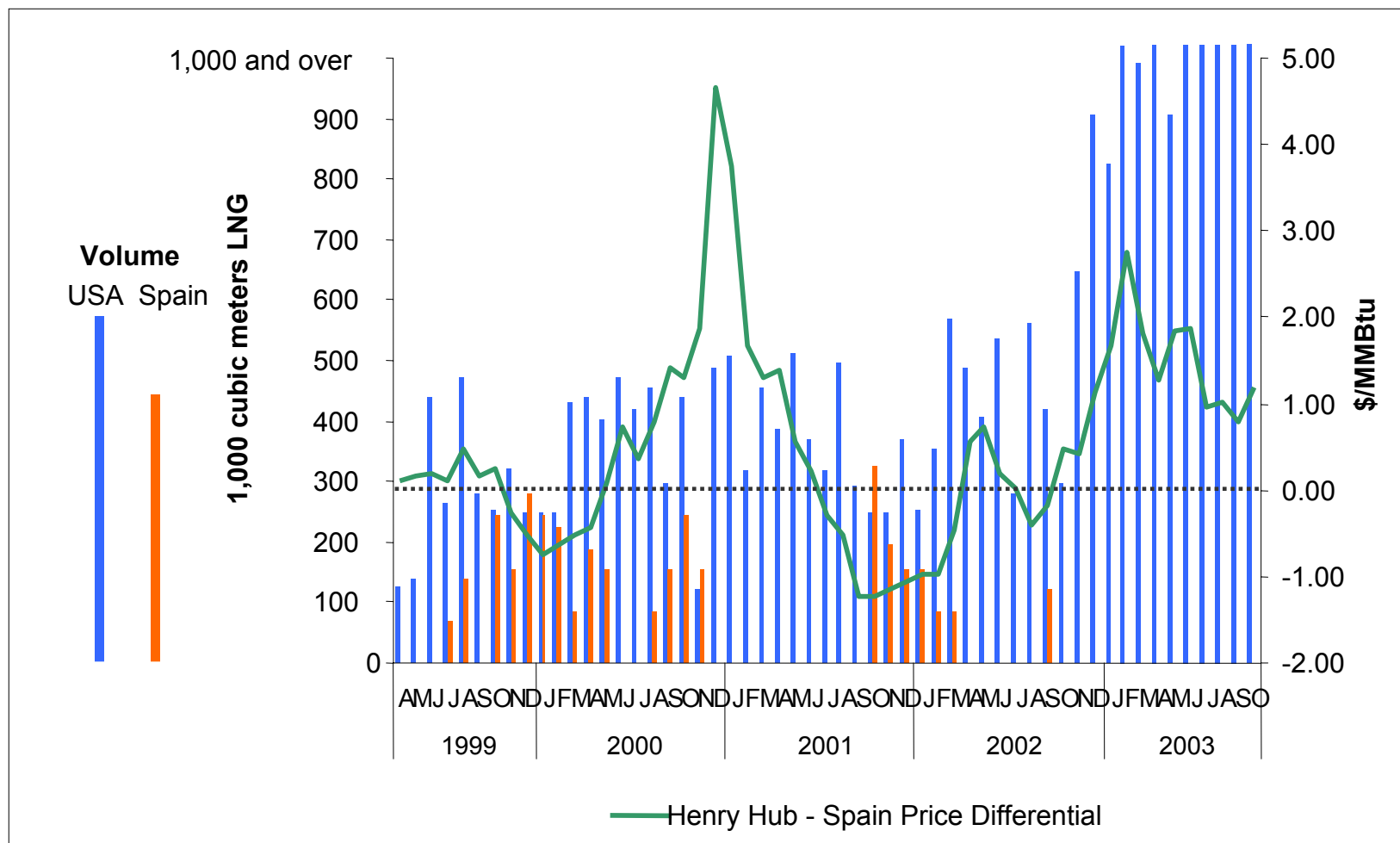
What can we learn from past disruptions?

- Only one case of an OPEC-style embargo to drive up prices
 - Algeria 1981-1983
- Most supply disruptions caused by internal political turmoil
 - e.g. Algeria (1997), Indonesia (2001), Argentina (2004)
- VERY few technical failures
- Only transit related gas trade disruptions relate to Former–Soviet Union disputes over non-economic legacy arrangements

Security in the “New Gas World”

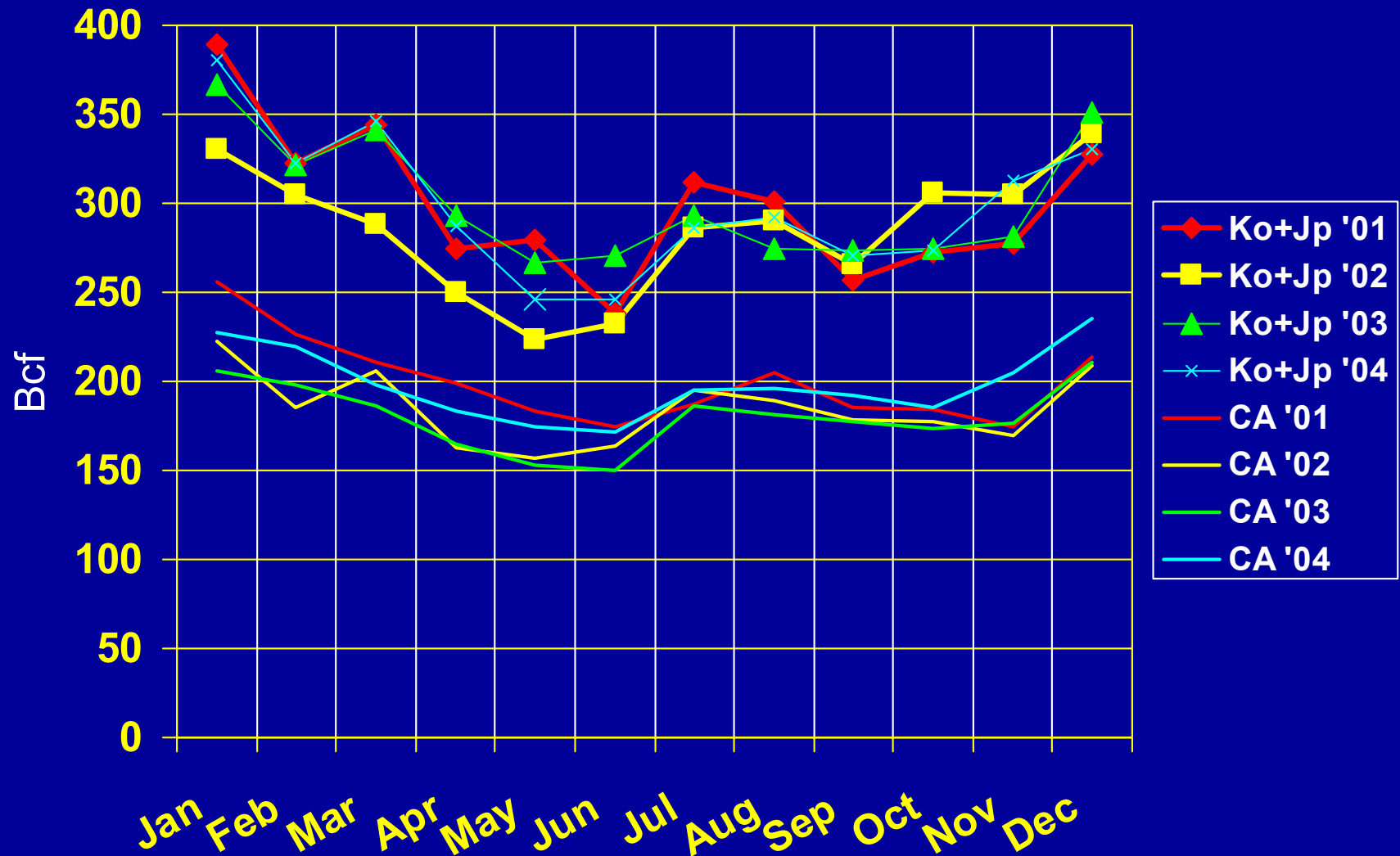
- “Old World” of LNG trade, where cargoes move on fixed point-to-point trades is under fire
- Evidence from Atlantic Basin suggests that LNG trade is rapidly changing
- “New”, more flexible, LNG trade in Pacific?

Trinidad's ATLANTIC LNG Cargoes Already Follow US-Spain Price Differential:



Gas Strategies Consulting Ltd.

Monthly Gas Consumption: (Korea + Japan) vs. CA



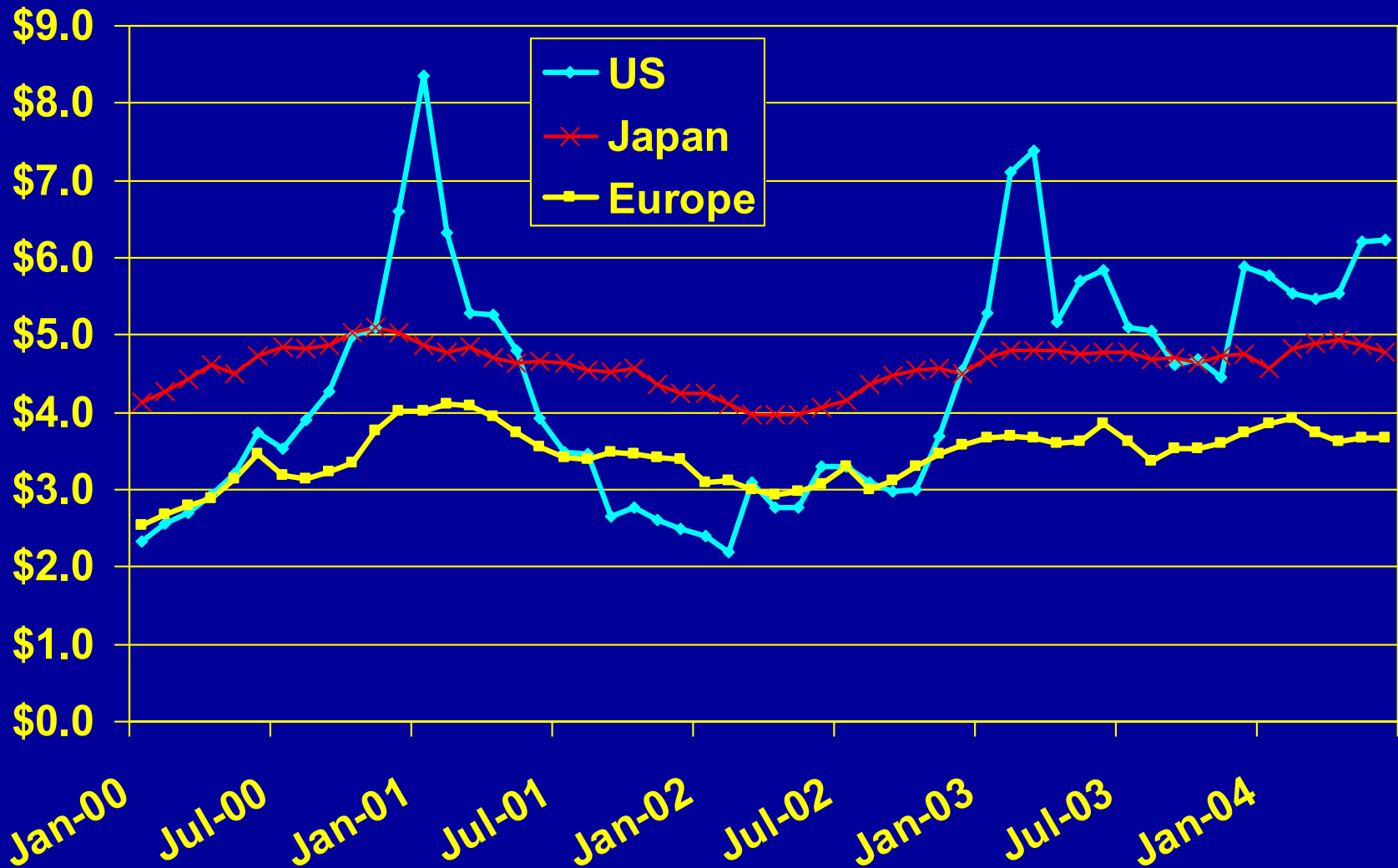
Potential LNG Suppliers to CA



Drivers for Pacific Basin LNG Trade Development

- Global shift to more flexible LNG trade
 - Liberalization of gas and electricity markets
 - Declining LNG costs (esp. liquefaction and regas)
 - Growth of new markets (CA, India, China)
 - Entry of energy super-majors to gas trade
- Share of flexible Pacific Basin trade?
 - economic fundamentals (transit costs, demand composition)
 - market rules of participants (esp. Japan, China, India)
 - Gas quality issues?

U.S. Spot, Japanese & European LNG Prices (\$/mmbtu)



**Henry Hub for U.S. data, average of Japanese & European landed LNG prices*

Conclusions

1. Market security, not supply security
 - Natural gas consumption and prices already highly volatile
 - In general, more LNG will lower price levels
 - Net effect on volatility will depend on other Pacific Basin (and global) markets
2. Pacific Basin arbitrage will be slow to develop, but not impossible
3. Be careful about regulatory goals:
 - A focus on supply security could remove opportunities for arbitrage—and thus inflate gas costs to California
 - Market power?